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TITLE OF THE INVENTION

INFORMATION TRANSMITTING APPARATUS, INFORMATION SAVING
5 APPARATUS, INFORMATION RECEIVING APPARATUS, METHOD FOR USING
THE SAME, AND RECORDING MEDIUM THEREOF

CROSS-REFERENCES TO RELATED APPLICATION

This application claims priority under 35 USC §119 to Japanese Patent
10 Application No. 11-225849 filed on August 9, 1999, which is incorporated herein by
reference.

BACKGROUND OF THE INVENTION

15 Field of the Invention

The present invention relates to an apparatus for sharing information via a
network, such as the Internet.

Discussion of the Background

20 Conventionally, information has been shared via servers that store various types
of information; such servers include WWW servers, directory servers, database servers,
file servers, etc., and are connected to a network. These servers are hereinafter referred
to as "information saving servers". To share information, a means is needed for
recognizing the fact that information has been saved and updated within an information
25 saving server. A means for providing notification from the receiver confirming receipt of

the particular information from an information saving server is also needed.

Particularly, transmitting notification mail using a mail protocol having a general-use mail address (which are determined uniquely for each member) provides notification to an information saving server of newly saved items and updates, wherein access and control protocol is controlled by a Firewall or the like. For example, a database update information mail notification system, as disclosed in Japanese Unexamined Patent Application Publication No. 10-63589, synchronizes the server and client by transferring mail of updated information to clients that have not accessed the server for a certain amount of time. One drawback of such a system that uses a means of transferring notification mail using the above mail protocol, is that notification is made by mail each time an update is made. In the event that the database is updated frequently, the receiver associated with the notification process a great number of notification mails. The large influx of notification mails may disrupt computer operations.

Another drawback is that the transmission notification cannot be carried out in the event that the spool on the client-side mail system overflows and notification mail cannot be delivered. Further, there is the problem that current email systems transmit in plaintext, thus, the information can be observed.

Furthermore, with the system disclosed in the above Japanese Unexamined Patent Application Publication No. 10-63589, even in the event that accesses to the database are recorded as described above, information which is immediately needed and information which is not needed for the time being differ according to the members accessing the database and the information saved therein; thus, such an arrangement does not provide a usable system.

SUMMARY OF THE INVENTION

The present invention has been made in light of the above, and accordingly, it is an object thereof to provide a useful information sharing apparatus, wherein sharing members can obtain shared information at appropriate timing, confirmation can be made
5 that the shared information has been transmitted to the receiver with a high degree of certainty, and security is ensured.

According to a first aspect of the present invention, an information saving apparatus for storing shared information, in which the information is shared via a network, comprising an input/output unit connected to the network. An application unit
10 performs predetermined data processing. A notification administration unit manages notifications that are exchanged between information-sharing users, wherein one of the information sharing users is a transmitting-shared information user; and another one of the information sharing users is a receiving-shared information user. A storing unit is configured to store sending conditions relating to sending of the notifications, data
15 including notification administration information specifying communication methods, and programs. A notification request for originating notification based on the notification to the receiving shared-information user is selectively sent to the notification administration unit based upon the application unit receiving shared information originating from a transmitting shared-information user via the network and the
20 input/output unit subjecting the shared information to predetermined data processing and storing in the storing unit, and upon a notification accompanying origination of shared information from the transmitting shared-information user being received. The notification administration unit makes reference to the notification administration information and originates the notification based on the notification to the receiving
25 shared-information user, according to the sending conditions and communication

method, in response to receiving the notification request.

The term "transmitting shared-information user" as used here refers to a shared-information user who transmits shared information, and "receiving shared-information user" refers to a shared-information user who receives shared information transmitted
5 from the transmitting shared-information user.

According to a second aspect of the present invention, an information saving apparatus for storing shared information, in which the information is shared via a network, comprises an input/output unit connected to the network. An application unit performs predetermined data processing. A notification administration unit manages
10 notifications that are exchanged between information-sharing users, wherein one of the information sharing users is a transmitting-shared information user; and another one of the information sharing users is a receiving-shared information user. A storing unit is configured to store sending conditions relating to sending of notifications, data including notification administration information specifying communication methods, and
15 programs. A notification request for originating notification based on the notification to the receiving shared-information user is selectively sent to the notification administration unit based upon the application unit receiving shared information originating from a transmitting shared-information user via the network and input/output unit subjecting the shared information to predetermined data processing and storing in the storing unit, and
20 based upon a predetermined event set at the application unit occurring. The notification administration unit makes reference to the notification administration information and originates the notification or information based on the notification to the receiving shared-information user, according to the sending conditions and communication method, in response to receiving the notification request.

25 The application unit may comprise a plurality of application modules, in which

each of said application modules being configured to perform data processing specific thereto. The application modules may add information used by application modules corresponding to the notification.

Also, the notification administration unit may be configured so as to immediately
5 originate notification or information based on the notification to the receiving shared-information user according to the sending conditions included in the notification administration information. The notification may be selectively stored in the storing unit and originated at the time determined by the sending conditions.

The notification administration unit may generate reception state administration
10 information for managing the reception state of the shared information by the receiving shared-information user upon receiving a reception state administration request from the application modules. It should be noted that the reception state administration information includes later-described reception confirmation notifications or information based on the reception confirmation notifications.

15 The application module may be configured to send the reception confirmation notification or information based on the reception confirmation notification. The application module may also be configured to send an origination request to the notification administration unit upon receiving a reception confirmation notification from a receiving shared-information user indicating that shared information originated from a
20 transmitting shared-information user has been received. The notification administration unit originates the reception confirmation notification based on the reception confirmation notification to the transmitting shared-information user upon receiving the origination request.

It should be noted that in the operation of the application module, there are cases
25 whereby an origination request is immediately sent to the notification administration

unit, as well as cases whereby this is managed together as reception state administration information. The reception state administration information and origination request are sent to the notification administration unit after a certain period of time.

The application modules may add information used by application modules
5 corresponding to the reception confirmation notification based on the reception confirmation notification.

According to a third aspect of the present invention, an information transmitting apparatus for originating shared information and transmitting notifications accompanying the originating of the shared information, wherein the information is shared via a
10 network, comprises a notification creating unit, and a data exchange unit. The notification creating unit obtains information to be contained in the notification accompanying the originating of the shared information and creates the notification based on the information. The data exchange unit transmit the shared information and the notifications that are created by the notification creating unit. The notification
15 creating unit may further perform at least one of encrypting the notification accompanying originating of the shared information, and adding an electronic signature to the notification.

Also, the data exchange unit may be further configured to transmit a reception state confirmation request for obtaining reception state information of the shared
20 information by the receiving shared-information user, to receive the reception state information, and to selectively decrypt the reception state information in the event that the reception state information has been encrypted, and to selectively verify an electronic signature.

According to a fourth aspect of the present invention, an information transmitting
25 apparatus for receiving shared information and transmitting reception confirmation

notifications via a network, comprises a reception confirmation notification creating unit, and a data exchange unit that is configured to send and receive data. The reception confirmation notification creating unit obtains information to be contained in the reception confirmation notification, and creates the reception confirmation notification
5 based on the information.

The data exchange unit may be further configured to receive shared information originated from the transmitting shared-information user, to selectively decrypt the shared information, to selectively verify an electronic signature, and to originate reception confirmation notifications that are created by the reception confirmation
10 notification creating unit to the transmitting shared-information user.

The reception confirmation notification creating unit may further perform at least one of encrypting the reception confirmation notification, and adding an electronic signature to the reception confirmation notification.

According to a fifth aspect of the present invention, an information transmitting
15 method comprises obtaining an information transmitting program via a network. The method also includes installing the information transmitting program in a computer and executing the program; transmitting shared information by the information transmitting program; and transmitting a notification to a receiver sharing the shared information that the shared information has been originated, either by the information transmitting
20 program or by other predetermined transmitting means.

According to a sixth aspect of the present invention, an information transmitting method comprises obtaining an information receiving program via a network. The method includes installing the information receiving program in a computer and executing the program, obtaining shared information by the information receiving
25 program, and transmitting the reception confirmation notification by the information

receiving program.

According to a seventh aspect of the present invention, a computer-readable medium carrying one or more sequences of one or more instructions for storing shared information, the information being shared via a network, the one or more sequences of one or more instructions including instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of receiving shared information originated from a transmitting shared-information user via the network; subjecting the shared information to predetermined data processing; storing the shared information which has been subjected to the data processing; receiving a notification accompanying the originating of the shared information from the transmitting shared-information user; making reference to sending conditions relating to sending of notification based on the notification, and notification administration information specifying communication methods; and originating the notification based on the notification to a receiving shared-information user, according to the sending conditions and communication method.

According to an eighth aspect of the present invention, a computer-readable medium carrying one or more sequences of one or more instructions storing shared information, the information being shared via a network, the one or more sequences of one or more instructions including instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of receiving shared information originated from a transmitting shared-information user via the network; subjecting the shared information to predetermined data processing; storing the shared information that has been subjected to the data processing; monitoring occurrences of predetermined events, and making reference to the sending conditions relating to sending of notifications according to the event and notification administration information

specifying communication methods; and originating the notification based on the notification to a receiving shared-information user, according to the sending conditions and communication method.

According to a ninth aspect of the present invention, a computer-readable medium

5 carrying one or more sequences of one or more instructions for originating shared information and transmitting notifications accompanying the originating of said shared information, information being shared via a network, the one or more sequences of one or more instructions including instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of obtaining

10 information to be contained in the notification accompanying the originating of the shared information; creating the notification, based on information to be contained in the notification accompanying the originating of the shared information; transmitting the shared information and the notification created by the notification creating unit; transmitting a reception state confirmation request for obtaining information of the

15 reception state of shared information by a receiving shared-information user; and receiving the reception state information.

According to a tenth aspect of the present invention, computer-readable medium carrying one or more sequences of one or more instructions for receiving shared information and transmitting reception confirmation notifications via a network,

20 information being shared via a network, the one or more sequences of one or more instructions including instructions which, when executed by one or more processors, cause the one or more processors to perform the steps of obtaining information to be contained in the reception confirmation notification notifying that the shared information has been received; creating the reception confirmation notification, based on information

25 to be contained in the reception confirmation notification; receiving the notification

accompanying the originating of shared information originated from the transmitting
shared-information user, and the shared information; decrypting the shared information
and notification in the event that the shared information and notification has been
encrypted, and verifying any electronic signature that has been attached thereto; and
5 transmitting a reception confirmation notification to the transmitting shared-information
user.

BRIEF DESCRIPTION OF THE DRAWINGS

10 A more complete appreciation of the invention and many of the attendant
advantages thereof will be readily obtained as the same becomes better understood by
reference to the following detailed description when considered in connection with the
accompanying drawings, wherein:

Fig. 1 is a diagram illustrating the role of reception confirmation notification;

15 Fig. 2 is a block diagram illustrating the configuration of an information saving
server, according to an embodiment of the present invention;

Fig. 3 is an example of notification contents;

Fig. 4 is an example of a member information table;

Fig. 5 is an example of a member list information table;

20 Fig. 6 is an example of a notification administration table;

Fig. 7 is an example of saving a notification queue;

Fig. 8 is an example of a reception state table;

Fig. 9 is a diagram of the operation of an information saving server during
notification distribution;

25 Fig. 10 is a flowchart of the operation of the notification administration unit;

Fig. 11 is a flowchart of the operation of the reception state administration module;

Fig. 12 is a block diagram of the information transmitting apparatus integrated with a Web browser, according to an embodiment of the present invention; and

5 Fig. 13 is a block diagram of the information receiving apparatus integrated with a Web browser, according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following is a description of the embodiments of the present invention, with
10 reference to the drawings. It is noted that in the following description, the member that transmits shared information is referred to as "transmitter", and the member that receives shared information is referred to as "receiver".

First, the overview of an example of an information sharing system configured of the information transmitting device, information saving device, and information
15 receiving device, according to the present invention, will be described. The information transmitting apparatus, information saving apparatus, and information receiving apparatus are connected to a network, such as the Internet, to share information by exchanging information and predetermined notifications. The information saving apparatus has means for providing multiple services and means for managing
20 notifications. In the event that a transmitter is going to transmit information to a particular receiver, the transmitter uses the information transmitting apparatus to transmit the shared information to the receiver, and transmits transmission notifications containing information for specifying the receiver, to the information saving apparatus. The information saving apparatus saves (i.e., stores) the shared information transmitted
25 from the information transmitting apparatus. Then, a transmission notification is

transmitted to the recipient (receiver) specified by the transmission notification sent from the information transmitting apparatus, according to the sending conditions and transmitting method specified separately.

5 The receiver receives this transmission notification, accesses the information saving apparatus, and obtains the shared information. Then, the receiver transmits a reception confirmation notification to the information saving apparatus to confirm that the shared information has been received with a high degree of certainty. The information saving apparatus receives this reception confirmation notification, manages the reception state of the shared information, and sends data indicating the reception state
10 to the transmitter, according to events such as confirmation requests or the like for the reception state of the shared information from the transmitter of the shared information.

In the event that the transmitter originates and shares predetermined information without specifying a receiver, the information saving apparatus stores this information, and transmits such information to the predetermined members according to separately-set
15 sending conditions and transmission methods. Also, there are cases wherein the transmission notification originated by the transmitter is directly sent to the receiver.

The role of "reception confirmation notification" in the above system will be described with reference to the example shown in Fig. 1. As seen in Fig. 1, a transmitter (or information sender) 101 uses the information transmitting apparatus, and a sharing
20 member (receiver) 103 uses the information receiving apparatus to exchange data, such as notifications and the like, as described below.

The notification transmitted from the transmitter 101 may be originated using general protocols and transmission methods, such as SMTP mail, pager, cellular phone, or the like. Accordingly, the receiver 103 uses various receiving methods such as
25 mailers and pages in addition to reception of notifications using the information

receiving apparatus, according to the way in which the notification was transmitted.

First, the transmitter 101 transmits the shared information to the information saving server 105 (①). Next, the information saving server 105 creates a notification, which indicates that a change has been made at the information saving server 105
5 relating to the shared information and sharing members (②, ②'). As indicated by ②' shown in Fig. 1, notification may be made directly from the transmitter 101 to the sharing member 103.

Upon receiving the notification, the sharing member 103 transmits a shared information obtaining request to the information saving server 105 (③). Upon receiving
10 the shared information obtaining request, the information saving server 105 distributes the corresponding shared information to the sharing member 103, which originated the obtaining request (④). Upon receiving the shared information from the information saving server 105, the sharing member 103 transmits a reception confirmation notification to the information saving server 105 (⑤). In the event that there is a
15 reception state confirmation request from the transmitter 101, for example, based upon the conditions, the information saving server 105 sends the reception confirmation notification sent from the sharing member or data indicating the reception state, to the transmitter 101 (⑥).

Thus, by notifying reception confirmation, the transmitter 101 can confirm that
20 the shared information transmitted by the transmitter 101 has been handed to the sharing members 103 with a high degree of certainty. Next, the details of an information saving server 105 are described.

Fig. 2 is a block diagram illustrating the configuration of the information saving server. The information saving server 1 is made up of an input/output unit 1a, which is
25 connected to a network such as the Internet and performs input and output of data. The

information saving server 1 also includes a storing unit 1b for storing data and various types of programs, and a processing unit 1c, which performs processing of data stored in the storing unit 1b and data input and output via the input/output unit 1a. In particular, the storing unit 1b stores data such as general databases or file systems, and programs.

5 The processing unit 1c is made up of an application unit 11 for performing various types of data processing and services such as accounting/bookkeeping applications and bulletin applications, and a notification administration unit 12. The application unit 11 includes multiple application modules for performing administration of notification events and notification contents, in addition to data processing. Also, the
10 application modules send notification requests containing notification contents and other information to the notification administration unit 12, according to notification events. As used herein “notification” refers to a message that is sent from or to the transmitter or receiver, such as transmission notifications sent from a transmitter or transmission notifications for an application module to notify that a change in shared information or
15 the like has occurred or reception confirmation notifications sent from receivers, etc.

 Events which generate notifications can be set from one application module to another (e.g., for processing bulletins or schedules, address books, document exchange, etc.). Accordingly, each application module has a notification request originating interface for sending notification requests to the notification administration unit 12 in the
20 event that an event occurs regarding which notification contents should be transmitted. Appropriate notification timing can be judged by compiling this notification request originating interface appropriately for each application module, even in the event that widely varied types of information are updated.

 Examples of notification events generated at an application module include
25 notification specification by the transmitter or receiver, changing of saved information,

virus detection, a notification event associated with an application, cases of transferring results and information at predetermined time intervals, predetermined time ranges, changing sharing members, public keys and IDs of members, updating information unique to members such as mail addresses and the like, and so forth.

5 Also, examples of information that the application modules convey in the notifications include login information, access information, notification serial Nos., member IDs, passwords, contents of shared information, titles, comments, instruction procedure methods, billing information, data consisting of information relating to shared information and transfer which has been compressed by a hash function, digital
10 signatures added by servers, recipient addresses, communication protocol types, recipient URLs (Uniform Resource Locator), URLs wherein formation is saved, reception time (date and time), the location where information is saved, addresses of application modules, reliability information such as virus inspection information, other information associated with the application modules (application name and documents generated
15 within the application), image or audio information by attachment files, facsimile, cellular phone, and so forth. The particular set of information to be included in the notification depends on the particular application module.

 An example of the notification contents, as shown in Fig. 3, include the type of application module (e.g., bulletin) set by the notification transmitter, the URL address
20 where the application module exists (e.g., http://www.***.co.jp), comments (e.g., "BE SURE TO READ"), member ID of recipient sharing member (e.g., Custom0100), notifying Email address (e.g., kimura@***.co.jp), and team (e.g., Developer Team). The notification contents may contain the information set by the notification transmitter (the comments and recipient information in the example in Fig. 3) and information which
25 the application module adds (type of application module and URL address in the

example in Fig. 3). Alternatively, the notification content may have only information that is set by the notification transmitter.

In the event that the recipient information, such as the member ID of the recipient sharing member, notifying Email address, team, etc., are not set by the notification transmitter, reference is made to a notification administration table, member information table, member list information table, and so forth. The notification contents are generated based on default settings.

The application modules 11 send reception state administration requests to a reception state administration module 12g, according to the settings. The reception state by the receiver of the shared information originated from the transmitter (i.e., whether reception has been completed or not) is thus managed by the reception state administration module 12g, by the reception state administration request. In this case, upon receiving reception confirmation notification from the receiver, the application module hands the reception confirmation notification to the reception state administration module 12g.

Further, the application module 11 sends a reception state obtaining request for obtaining information relating to the reception state corresponding to the notification request ID to the reception state administration module 12g, and obtains reception state information regarding the shared information originated by the transmitter. Then, based on this information, and the member information table, member list information table, notification hysteresis, etc., a reception state table of which an example is shown in Fig. 8 is generated. The contents of this reception state table are sent to the transmitter, according to requests from the transmitter.

Additionally, the application module sends a notification request for a reception confirmation notification to the reception state administration module 12g, according to

the notification event. Due to this notification request, reception confirmation notification or information based on the reception confirmation notification is originated to the transmitter via the notification transmitting module 12f, by the reception state administration module 12g.

5 The reception state table (Fig. 8) is a table for performing batch managing of the reception states of multiple receivers. The reception state table is made up of records including "notification request ID", "member ID", "existence and contents of "reception confirmation" (including information contained in the reception confirmation notification, e.g., electronic signature, etc.), state of "notification distribution", state of
10 "information distribution" managed by the application module, and so forth.

Existence or non-existence of "reception confirmation" indicates whether or not there has been reception notification from the notification receiving apparatus. The state of "notification distribution" indicates whether the notification transmission has been completed, queued (awaiting distribution), or whether communication failure has
15 occurred due to a communication fault, and so forth. The state of "information distribution" indicates whether shared information has been distributed (whether it has been downloaded to the recipient receiver).

It is noted that in the above description, the arrangement is such that the reception state administration module 12g receives the notification request for a reception
20 confirmation notification from the application module 11 and this reception confirmation notification is originated to the transmitter; but there are cases wherein the application modules transfers a reception confirmation notification to the transmitter, based on specifications by the shared information receiver (sharing member).

The notification administration unit 12 is made up of a notification request
25 reception module 12a, a member identifying module 12b, a notification control module

12c, a communication queue administration module 12d, a notification hysteresis recording module 12e, a notification transmission module 12f, and a reception state administration module 12g.

The member IDs, application IDs, notification request IDs, notification
5 administration table, etc. are managed in order to distribute notification requests from multiple application modules 11 to multiple members. Also, the contents of notification or formats may be changed for each application module 11.

The notification request reception module 12a receives notification requests that are originated by the application modules 11. The notification request contains
10 information for identifying the member (notification transmitter) using the application module 11 which originated the notification request (i.e., member ID and the like), the contents of the information to be notified, information of identifying the notification recipient member, and application IDs for identifying the multiple application modules. In the event that the notification request message is accepted in a normal manner, a
15 notification request ID that identifies the notification request uniquely is generated. It is noted that a different application ID is appropriated for each application module 11, and that the application module 11 originating the notification request is identified.

The member identifying module 12b identifies sharing members, and more specifically identifies members specified in various forms (e.g., member ID uniquely set
20 to the system, Email address, telephone No., team of the sharing member, etc.), by inquiring member information databases that contain member information, and similar resource databases set up on the network.

An example of a member information table is shown in Fig. 4. In this example, the member information table 401 includes a Member ID field 403, and a Notifying
25 Address field 405. In the event that a notification recipient that is unregistered has been

specified, a new member ID may be generated dynamically (see reference numeral 41 in Fig. 4).

Also, in the event that a notification request is received for a team containing multiple members, an arrangement may be used such as shown in Fig. 5. Fig. 5 is an example of a member list information table that can support teams of members. The member list information table 501 includes a Member ID field 503 and a Team field 505. Member IDs are obtained for each member belonging to the team as recipient of the notification, based on the specified team name (identifier).

The notification control module 12c manages the notification administration table (notification administration information), in which the rules for each member regarding notification are stored. The notification control module 12c also performs distribution of notifications according to the settings of the notification administration table (Fig. 6) for each member. Thus, notification distribution can be carried out as intended. As for members regarding which no notification administration table has been set in particular, default settings are applied. It is noted that the default settings may be set as appropriate for each team, and for each application.

Also, the notification control module 12c makes reference to the notification administration table upon receiving notification. A decision is then made whether to actually transfer the notification, or whether to hand it to the notification queue administration module 12d, based on the sending conditions for the notification recipient member. In the event that the sending conditions are not satisfied, the notification is discarded. In the event that the settings are not for immediate sending, the notification is handed to the notification queue administration module 12d. In the event that the settings are that the notification is to be sent immediately, the notification information including the notification contents and notification method are handed to the notification

transmitting module 12f.

Fig. 6 shows an example of a notification administration table. The notification administration table 601 includes a Member ID field 603, a Sending Conditions field 605, and a Notification Method field 607. That is, the table 601 is made up of records for setting member IDs for identifying members, sending conditions, and notification methods (communication protocols) used for notification. The member ID 603 is set to a code which is particular to the system and which uniquely identifies the member. The sending conditions specify the criteria that need to be met to transmit the notification to the recipient. These conditions are separately defined and set. In this example, notification priority, corresponding application module 11, upper limit of the notification queue (Que Max Count; set to 10 for the sending conditions for the member with the ID Custom 0101 as shown in Fig. 6), notification transmitter (sender), etc., are be used as the conditions. The notification method and communication protocol used for notification transmission are set for the notification method. In the example shown in Fig. 6, transmission of notifications to the member with the member ID of "Custom0010" will be made by SMTP (Simple Mail Transfer Protocol) mail transmission.

In this way, the notification administration table 601 is set with notification recipient address(s), type of communication protocol used, notification method such as date and time at which transmission is permissible, transmission permission priority for determining the transmission time of the notification based on the priority of the shared information, the transmission permission application for specifying that the notification is transmitted in the event of using which application, notification contents, and other sending conditions. Each member may change the settings of the notification administration table 601 depending on each application module 11 used. Also,

information stored in external databases set up on the network may be used to substitute for information contained in the notification administration table. For example, in the event of transmitting mail notification to a receiver having a certificate issued by a certain certifying station, the notification control module 12c can access a directory server to obtain the information relating to the member (receiver) registered to this certifying station, and thus obtain the mail address of the receiver from the obtained information.

Also, default sending conditions, notification method, etc., are also appropriately set to the notification administration table. The default settings may be set according to each application module, or may be such that the sharing member can select which default settings to use. The sending conditions and notification method and the like can be changed by the member. Further, the same member may set multiple sending conditions and notification methods. For example, the member may set different settings for each application module used (e.g., using different settings for "bulletin" and "settlement system", etc.).

Also, the notification administration table 601, member information table, member list information table, etc., may be stored in an external storing device rather than in the storing unit 1b, so as to perform obtaining, updating, and saving of the tables from the external storing device.

The notification queue administration module 12d stores the notification information in a notification queue, and manages the queued notifications for each member. The notification information stored in this notification queue is processed according to the notification sending time specifications. At the timing that the notification sending timing is satisfied, the notification information is handed to the notification transmitting module 12f. Even in the event that the notification is based on a

notification request generated by different application modules 11 or different notification events, processing is performed at the same timing that the conditions are satisfied. The functions of this notification queue administration module 12d allows multiple notifications to be batch-distributed as a single notification.

5 Fig. 7 illustrates an example of notification queue saving of the notification. The records of notification queue 701 include a notification request ID 703, which is set by the notification control module 12c, member ID 705, notification contents 707, notification sending time 709, notification method, etc., 711. These parameters 703-711 are sequentially stored.

10 The notification hysteresis recording module 12e saves the contents of notification, notification hysteresis, etc., to the storing unit 1b or external storing device.

 The notification transmitting module 12f generates notification information according to the notification method and communication protocol. Specifically, format settings and the like are performed according to SMTP mail transmission, (cellular)
15 phone, facsimile, and other like notification methods and communication protocols used for actual transmission. URLs including application IDs may be transmitted with the notification information. The notification receiving apparatus can identify the application module used, from this application ID.

 Also, handling the notification as a single file and transmitting as a mail
20 attachment file facilitates ease of notification management on the side of the member. Also, this attachment file may be encrypted and transmitted. Further individual communication protocols may be used for transmitting the notification, but an arrangement wherein the notification information is formed into a single file and sent as a mail attachment file allows notification distribution to be carried out using general-use
25 communication protocols, such as SMTP and HTTP (HyperText Transfer Protocol).

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The reception state administration module 12g manages the reception state according to reception state administration requests from application modules. Fig. 8 is an example of a reception state table 801, which includes a Notification Request ID field 803, a Member ID field 805, a Confirmation of Reception field 807, a Distribution of Notification field 809, and a Distribution of Information field 811. In the event of managing the reception state, the reception confirmation notification handed from the application module 11 is saved for each application ID, member ID and notification request ID, thereby managing the reception state. For example, judgment can be made regarding whether reception of shared information by the receiver has been completed, depending on whether a saved reception confirmation notification exists. Also, with regard to the reception state obtaining request from the application module, information indicating whether reception of the shared information has been completed by the receiver or not is handed to the application module 11. Also, in the event that there has been a notification request for reception confirmation notification from an application module 11, the reception state administration module 12g originates the corresponding reception confirmation notification or information based on the reception confirmation notification, to the transmitter via the notification transmission module 12f.

The storing unit 1b (Fig. 2) is made up of a non-volatile recording apparatus, such as a hard disk, magneto-optical disk, etc.

Also, the processing unit 1c has a memory and a CPU (Central Processing Unit), with the functions thereof being realized by loading programs (not shown) executed for realizing the functions of the processing unit 1c to memory.

Also, connected to the information saving server 1 are peripheral equipment, i.e., an input device, display device, etc (neither shown). As used herein, the term "input device" refers a keyboard, mouse, or the like. Also, " display device" refers to a CRT

(Cathode Ray Tube), liquid crystal display device, etc. Also, according to an embodiment of the present invention, the information saving server 1 is described as being a single apparatus; however, it is recognized by one of ordinary skill in the art that the functionalities of server 1 can be distributed across multiple servers. Next, the operation of the information saving serving 1 according to the present embodiment thus configured will be described.

With reference to Fig. 9, description will be made regarding the operation of the information saving server 1 at the time of (transmission) notification distribution. It is assumed that the sharing members 901 exchange data with the information saving server 1 using notification transmitting apparatuses and notification receiving apparatuses. The transmitter transmits the shared information and the transmission notification containing the information that specifies the member for sharing this shared information (①, ①'). The application modules 1 and 2 perform predetermined processing on the received shared information and store this in the storing unit 1b (②, ②'). In addition, application modules 1 and 2 analyze the contents of the shared information, and send the notification request to the notification administration unit 12, according to the contents thereof (③, ③').

The notification administration unit 12 analyzes the notification requests that are received from the application modules 1 and 2, and also make reference to the notification administration table 601 (Fig. 6), to notify the appropriate sharing member 901 that the transmitter has specified that shared information has been uploaded to the information saving server 1 (④). This notification may be sent via the network as e-mail or the like, or may be sent using a pager, (cellular) phone, etc.

Next, the details of the operation of the notification administration unit 12 is shown in the flowchart of Fig. 10. Upon originating a notification request from an

application module, the notification request reception module 12a accepts this notification request (step S01). Then, the member identifying module 12b identifies the sharing member from the contents of the notification request (step S02). Next, the notification control module 12c, as in step S03, makes reference to the notification-related information, such as member information, notification administration table, notification hysteresis, etc., for each sharing member identified in step S02, in the storing unit 1b.

Further, the notification control module 12c determines whether to transmit the notification, based on the sending conditions in the notification administration table (step S04). Then, in the event that a decision is made in step S04 to transmit the notification to the sharing member at a later time, the notification control module 12c sends the notification information to the notification queue administration module 12d. Then, the notification queue administration module 12d accumulates this notification information in the notification queue of the storing unit 1b (step S05). In the event that a decision is made in step S04 to transmit the notification to the sharing member 901 immediately, the notification control module 12c sends the notification information to the notification transmitting module 12f. Next, the notification transmitting module 12f transmits the notification to the specified sharing member (step S06).

The hysteresis (notification history) of the transmission of the notification to the sharing member 901 by the notification transmission module 12f is stored in the storing unit 1b by the notification hysteresis recording module 12e (step S07).

The operation of the reception state administration module 12g is shown in the flowchart of Fig. 11. It is assumed that the reception state administration module 12g has received a reception state administration request from an application module, and performs management of the reception state. In step S11, the reception state

administration module 12g receives a reception confirmation notification from the receiver, which has obtained the shared information, via the application module. This reception confirmation notification, as in step S12, is saved in the storing unit 1b. Next, a decision is made whether there is a data obtaining request for the reception state regarding a specified member or the group, from the application module (step S13). If there has been a data obtaining request for the reception state of a specified member or the group, the corresponding data (e.g., data corresponding to the notification request ID in the event that a transmission notification has not been carried out) is handed to the application module (step S14). Subsequently, a decision is made regarding whether there is a notification request for reception confirmation notification from the application module (step S15). If there is a notification request for reception confirmation notification, the reception confirmation notification or information based on this reception confirmation notification is originated to the information transmitter, via the notification transmitting module 12f (step S16). The reception state data obtaining request by an application module as described above originates from an event such as a reception state confirmation request or the like from the notification transmitter to the application module. Also, as described above, the reception state data handed to the application module by the reception state administration module 12g is used for generating a reception state table in the application module.

The order of steps S13 and S15 is only by way of example; it is recognized that step S15 may precede step S13. Alternatively, only one of the steps S13 or S15 may performed.

With the present embodiment, the arrangement comprises a function for transmitting notifications from the transmitter to the receiver and for sending reception confirmation notifications from the receiver to the transmitter. However, an arrangement

may be made wherein the function for sending notifications from the transmitter to the receiver may be omitted, and used with only the function of sending reception confirmation notifications to the transmitter.

Turning now to the information transmitting apparatus, a description of the apparatus according to an embodiment of the present invention is described with reference to Fig. 12. The information transmitting apparatus 2 according to the present embodiment has functions for transmitting information to the information saving apparatus used by the sharing members, and functions for sending notifications to the sharing members. The information transmitting apparatus 2 is made up of a data exchange unit 2a and a notification creating unit 2b. In the present embodiment, the information transmitting apparatus 2 will be described in form of a Web browser Java applet (or as a script, macro program, plug-in, etc., executed by a client described on a Web page); the functions of the information transmitting apparatus 2 are built into the web browser, so as to use the functions of the Web browser executed on a personal computer or the like.

Two configurations exist for the information transmitting apparatus 2: one wherein the information transmitting apparatus 2 is installed in the terminal apparatus of the client beforehand, and the other wherein the Java applet or the like to realize the information transmitting apparatus 2 is downloaded from the information saving server 1 to perform exchange of information at the time of executing. Making the information transmitting apparatus 2 into a downloadable configuration such as a Java applet or the like means that users employing information exchange apparatuses that use Web browsers or the like can start the information transmitting apparatus 2 from their Web browser and transmit shared information and notifications.

The information transmitting apparatus 2 may be created as a dedicated Web

browser, to be installed in a computer and executed thereby, or further may be realized as a dedicated apparatus of a form that includes the computer.

Under the present embodiment, communication functions 1201, input/output functions 1203, and data obtaining and saving functions 1205, which the Web browser 2 has, are used to perform transmitting of shared information and notifications.

The data exchange unit 2a transmits shared information, transmission notifications generated by the notification creating unit 2b, reception state confirmation requests, etc. Also, in the event that there is a hierarchical structure of files and folders, i.e., a directory, this is converted into a data format with hierarchical structure information added thereto. Thus, data of folders having a hierarchical structure and containing multiple files can be transmitted in batch fashion.

Also, if multiple communication protocols are supported, the optimal communication protocol is selected (e.g., SMTP, HTTP, LDAP (Lightweight Directory Access Protocol), Web mail). The present embodiment uses the communication functions of the Web browser, so data can be converted into formats matching the communication protocol and sent, with the communication functions of the Web browser. However, if processing such as encryption or the like has been performed, or in the event that multiple pieces of data are to be transferred, the data is converted into an optimal format for communication at the data exchange unit 2a, and then transferred to the Web browser.

The notification creating unit 2b obtains information to be included in the transmission notification according to operations of the transmitter, and generates a transmission notification to notify the recipient receiver that shared information has been originated. The contents that are to be included in the transmission notification encompass time of transmission, information relating to the transmitter (ID, address), a

part of the transmitted information (data name, compressed data), destination (address, URL address, destination application, etc.), comments by the transmitter (text, commands, etc.), encrypted notifications, notifications with digital signatures, and so forth (see Fig. 3). Also, a reception state confirmation request for confirming the reception state of the transmitted shared information (whether received by the sharing member (receiver) is generated, according to operations of the transmitter. An arrangement may be made wherein, in the event of the application module creating a notification according to an event which occurred in the information saving server 1 and transmitting this to the receiver, or in the event that a transmission notification is not necessary, the notification creating unit 2b does not generate a transmission notification, and only generates a reception state confirmation request.

Also, the notification creating unit 2b performs encryption to the created transmission notification or applies an electronic signature thereto. This is due to the fact that the notification contents themselves notifying that confidential information has been saved in the information saving server 1 might be confidential information; e.g., the transmitter transmitting encrypted confidential information to the information saving server 1. This case includes instances wherein the notification contents (comments of the transmitter and information contents or a part thereof) are encrypted and transmitted, or an electronic signature is attached thereto and transmitted.

For example, if comments or names relating to a contract are in the notification, unauthorized viewing thereof may lead to leakage of confidential information; on the other hand, not including such information may lead to the priority of the notification not being recognized and an information obtaining request to the information saving server 1 may not be originated. Also, there is the possibility that an individual with malicious intent may save a file (such as a virus) to the information saving server and pretend to be

another user and send a notification, and in such a case the user receiving the notification may trust the sender pretending to be another user and download the file with malicious intent. In such cases, an arrangement is desired which provides good security, and reliability for the notifications themselves.

5 Accordingly, the notification creating unit 2b has encryption functions and digital signature functions for improving security relating to such notifications.

 In the event of performing digital signatures to the notification contents, a shared-key encryption method (e.g., RC2 or DES (Data Encryption Standard) or the like), a public key encryption method (e.g., the RSA (Rivet-Shamir-Aldleman) method) or other
10 like commonly-used encryption methods may be used, or multiple encryption methods may be used in conjunction (e.g., using both DES and RSA) to perform the encryption.

 In the event that a digital signature is performed regarding the notification contents created at the notification creating unit 2b, the present embodiment performs the digital signature by a process for compressing information using hash functions (e.g.,
15 MD5, SHA-1, etc.) and creating a message digest, and a process of encryption, i.e., two processes. The RSA public key encryption method, DSA, etc, for example, are used for the algorithm used for encryption. The digital signature includes cases wherein a process for encryption with a secret key is performed regarding information not formed into a message digest, or combinations of a message digest and this information, in addition to
20 the above processes. A digital signature is encrypted with a secret key (signature key) with regard to the information, regardless of compression or no compression.

 Also, the notification transmitted from the information transmitting apparatus 2 is transmitted to the above information saving server 1, but this may be directly transmitted to the receiver of the shared information. For example, the communication functions of
25 the Web browser may be used to access a SMTP server, and transfer the transmission

notification via the SMTP server. The SMTP server address may be specified by the member, or reference may be made to address data stored in an external storing device. Also, the transmission notification may be directly sent using a pager, (cellular) phone, facsimile, etc., besides the above-described.

5 Next, the operation of the information transmission apparatus 2 according to the present embodiment thus configured will be described. In a system for sharing information using an information saving server 1, the information transmission apparatus 2 for transmitting shared information and transmission notifications to the information saving server 1 is subjected to settings for transmission notification by the transmitter at
10 the time of transmitting the information. The items set here are items that are managed in a manner corresponding to each application module, and are determined separately. The information transmitter, which saves the shared information on the information saving server 1, specifies the member to share the shared information with.

 There are two approaches for specifying the member. The first approach is to
15 utilize a member list (or a team), which enumerates all members that are registered. The member list (a list registering a team and the team members) is saved in the information saving server 1 or specifying a team defined by the member list information table. Another approach involves selecting and specifying a specific member at the time of transmitting.

20 Under the second approach, an ID or mail address or a serial No. of an electronic certificate or the like issued from a reliable third party or the like, uniquely identifying the member, is used. If the mail address of a specific member is not known, the mail address may be obtained from electronic certificates, or may be obtained by accessing a directory server or database on the network (using LDAP, for example).

25 At the point that the settings specific to the application module to be used, the

settings for the member to send the information to, etc., are completed by the transmitter, the notification creating unit 2b creates a transmission notification. Then, the data transmitting unit 2a transmits the transmission notification that is created by the notification creating unit 2b and the shared information to the information saving server

- 5 1. As described above, the transmission notification may be directly transmitted to the receiver of the shared information, rather than to the information saving server 1.

Also, upon the transmitter setting a reception state confirmation request of the information transmitted by the transmitter, the data exchange unit 2a transmits the reception state confirmation request to the information saving server 1 and obtains the
10 reception state (i.e., whether or not the recipient receiver has completed reception). An arrangement may be used wherein reception of the reception state data from the information saving server 1 results in the reception state of the transmitted information being displayed, using the display functions of the Web browser. Thus, the transmitter can confirm whether the transmitted information has been received by the recipient
15 receiver.

Fig. 13 shows a diagram of the information receiving apparatus according to an embodiment of the present invention. The information receiving apparatus 3 according to the present embodiment has functions for obtaining information from the information saving apparatus shared by the sharing members, and functions for sending reception
20 confirmation notifications to the sharing members and the information saving apparatus. The information reception apparatus 3 is made up of a data exchange unit 3a and a reception confirmation notification creating unit 3b. In the present embodiment, the functions of the information receiving apparatus 3 is integrated with a Web browser Java applet (or as a script, macro program, plug-in, etc., executed by a client described on a
25 Web page). The functions of the Web browser can be executed on a personal computer

or the like. As with the information transmitting apparatus 2, two configurations of the information receiving apparatus 3 are described. In the first configuration, the information receiving apparatus 3 is installed in the terminal apparatus of the client beforehand. The second configuration involves use of a Java applet or the like to realize the information receiving apparatus 3 is downloaded from the information saving server 1 at the time of executing and assembled into the Web browser, to perform exchange of information.

Constructing the information receiving apparatus 3 into a downloadable configuration such as a Java applet or the like means that users can start the information receiving apparatus 3 on their Web browser and obtain shared information and transmit reception confirmation notifications.

The information receiving apparatus 3 may be created as a dedicated Web browser, which is to be installed in a computer and executed thereby, or further may be realized as a dedicated apparatus of a form including the computer.

With the present embodiment, communication functions 1301, input/output functions 1303, and data obtaining and saving functions 1305 within the Web browser 3 are used to perform reception of the shared information and transmission notifications, transmitting of reception confirmation notifications, etc.

If the received transmitted notification or shared information has been encrypted, the data exchange unit 3a performs decrypting thereof; and if an electronic signature has been applied thereto, the confirms data exchange unit 3a the electronic signature. Also, in the event that hierarchical structure information has been added to the received shared information, the files and folders are restored according to this information. Also, a reception confirmation notification created by the reception confirmation notification creating unit 3b or a shared information obtaining request for obtaining shared

information is transmitted. Also, in the event that multiple communication protocols are supported, an optimal communication protocol is selected (e.g., SMTP, HTTP, LDAP, Web mail).

With the present embodiment, the communication functions 1301 of the Web browser are used, so data can be converted into formats matching the communication protocol and transmitted, with the communication functions of the Web browser. However, in cases where processing such as encryption has been performed, or wherein multiple pieces of data are transferred with the multiple pieces of data having been converted into a special communication format, the communication format is analyzed by the data exchange unit 3a, divided into individual data units, and thus saved and displayed. If there is information which has been encrypted, that portion is decrypted and similarly saved and displayed.

Further, the data exchange unit 3a has built in the security method that is specific to the information sharing system and the application module of the information saving server 1. In the event that there is shared information saved at the information saving server 1 in an encrypted state, a separate device for decrypting is necessary to obtain and view the shared information. Providing the data exchange unit 3a with the decrypting functions allows the encrypted information to be decrypted on the user terminal, without preparing special decryption software. Also, at the data exchange unit 3a, a message digest of the reception data at the point of reception is created sign hash functions, and the digital signature added to the data is compared and verified, thereby verifying the security of the data.

The decryption performed at the data exchange unit 3a uses the commonly-employed shared-key encryption method or public key encryption method, or both. Further, in the event that double encryption is performed by the above encryption and the

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encryption performed between the information saving server 1 and the Web browser provided to the terminal of the receiver, the communication functions 1301 of the Web browser execute decryption corresponding to the encryption performed by the information saving server 1, following which decryption is performed again by the data exchange unit 3a, thereby allowing the original data to be viewed.

The reception confirmation notification creating unit 3b obtains information to be contained in the reception confirmation notification; for example, the reception time of the shared information, a part of the received shared information (data name, values for compressing data), information relating to the receiver (ID, address, etc.) comments of the receiver (positive or negative information regarding the received shared information, text, commands, etc.), and information regarding the receiving party ((URL) address, ID of transmitting application module, etc.). Then, a reception confirmation notification containing the obtained information will be generated.

The reception confirmation notification creating unit 3b further subjects the created reception confirmation notification to encryption and electronic signature. This is due to the fact that the notification contents themselves notifying reception confirmation might be confidential information, in cases such as the receiver has received encrypted confidential information from the information saving server 1. In this case, there is the need for the reception confirmation notification contents (comments of the receiver and reception information contents or a part thereof) to be encrypted and transmitted, or for an electronic signature to be attached thereto and transmitted.

For example, if comments or names relating to a contract are in the reception confirmation notification, unauthorized viewing thereof may lead to disclose of confidential information; but not including such information may lead to the transmitter or the information saving apparatus 1 not being able to obtain information necessary for

reception confirmation of the receivers. Also, there is the possibility that a user with malicious intent may pretend to be another user and send a reception confirmation notification. In such a case, a decision need to be made as to whether the reception is completed, based on the reception confirmation notification relating to the user which the sender is pretending to be. In such cases, an arrangement is desired which provides good security, and reliability, for the reception confirmation notifications themselves.

Accordingly, the reception confirmation notification creating unit 3b has encryption functions and digital signature functions for improving security relating to such notifications. If digital signatures are utilized for the reception confirmation notification contents, various encryption methods, individually or in combination, may be used in conjunction (e.g., using both DES and RSA) to perform the encryption. These methods, for example, include the following: a shared-key encryption method (e.g., RC2 or DES or the like), a public key encryption method (e.g., the RSA method), as well as other like commonly-used encryption methods

In the event that a digital signature is performed with respect to the reception confirmation notification contents that are created at the reception confirmation notification creating unit 3b, the present embodiment performs the digital signature by a process for compressing information using hash functions (e.g., MD5, SHA-1, etc.) and creating a message digest, and a process of encryption, i.e., two processes. The RSA public key encryption method, DSA, etc, for example, are used for the algorithm used for encryption. The digital signature includes cases wherein a process for encryption with a secret key is performed regarding information not formed into a message digest, or combinations of a message digest and this information, in addition to the above processes. A digital signature is encrypted with a secret key (signature key) with regard to the information, regardless of compression or no compression.

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Next, the operation of the information receiving apparatus 3 according to an embodiment of the present embodiment is described. In a system sharing information using the information saving server 1, the information transmitting apparatus 2 transmits an obtaining request (shared information obtaining request) to the information saving server 1, based on information contained in a received transmission notification. It is noted that a receiver may receive a transmission notification in an environment in which the information receiving apparatus 3 does not exist. In such a case, the receiver accesses the information saving server 1 from his/her own user terminal and receive verification, and then sends a shared information obtaining request. Consequently, a program such as a Java applet or the like having the functions of the information receiving apparatus 3 is downloaded, and the information receiving apparatus 3 installed to the user terminal sends a shared information obtaining request again to the information saving server 1, thus obtaining the shared information from the information saving server 1.

15 Upon the data exchange unit 3a receiving the shared information from the information saving apparatus 1, the reception confirmation notification creating unit 3b obtains information to be contained in the reception confirmation notification (information required individually for the application module to be used, predetermined input information by the receiver, etc.), and a reception confirmation notification is generated based on this information. Then, the data exchange unit 3a transmits the reception confirmation notification that is created by the reception confirmation notification creating unit 3b to the information saving server 1 or the information transmitter.

25 Although the above description has the information transmitting apparatus 2 and the information receiving apparatus 3 as individual apparatuses, the information

transmitting apparatus 2 and the information receiving apparatus 3 may be combined as a single apparatus.

Next, a process managing system for managing the manufacturing processes of multiple plants will be described as an example of an information sharing system using the above-described information saving server 1, information transmitting apparatus 2, and information receiving apparatus 3. For instance, at plants A and B of a company M, the work contents of the manufacturing lines are all performed according to set procedures (as defined in an operation manual). The network of plants A and B is connected to the process management system via the Internet. The process supervisor and the workers access the information saving server 1 using the Web browser that is provided to the user terminals, and exchange information relating to process management. The information saving server 1 which stores shared information is made up of manual saving applications that are loaded on a WWW server, process management applications, a notification administration unit 12, and a database server which can be accessed from the WWW server. Conventionally, such process managing systems have been configured for each factory; but with company M, a system for centrally managing the processing managing system has been employed in order to reduce system operators and management costs.

The manual saving applications save and manage manuals created for each work process. The creating, updating, and discarding of these manuals is performed by process designers/managers, and the process designers/managers save newly created manuals or updated manuals to the WWW server.

These manuals are referred to and followed by the workers, so at the point of creating, updating, or discarding manuals, the ID of the manual saving application, information informing of the creating, updating, or discarding of a specific manual, and

information relating to a list of line supervisors for plants A and B which will be the recipients, are necessary. In the event that such information is not readily available, the information can be obtained from plant A, plant B, or the head office, thereby identifying the members registered as line supervisors.

5 At this time, members who have been line supervisors for some time are already registered to the process management system, but members who have newly become line supervisors may not be registered to the process management system. In this case, automatic registration is made thereof as a new user. The notification control module 12c of the WWW server sends notifications according to the sending conditions of each
10 member. For example, sending conditions are set according to the work forms on site, such as a line supervisor at the line being notified by a pager for the time being, a line supervisor at a computer terminal being notified by Email in real-time, and so forth.

 Further, with regard to notification requests to be transferred immediately, the notification control module 12c sends the notification request to the notification
15 transmission module 12f, and for other notifications, transfers the notification to the notification queue administration module 12d. At the notification queue administration module 12d, the notification requests are managed along with other notification requests (including those issued by process managing applications); and at the point that the transmission time arrives, the notification queue administration module 12d sends these
20 requests to the notification transmission module 12f. The notification transmission module has communication functions which can use different lines such as telephone lines and LANs, and different communication protocols, and thereby transfers the notifications with the communication method set to the notification administration table. Also, notifications regarding which transmission has been completed are stored in a
25 database by the notification hysteresis recording module 12e. The line supervisors upon

receiving the notification view the notification contents, access the manual saving application on the WWW server, and obtain the newest distributed manual using FAX distribution or file transfer.

The process managing application may be an application that manages the state of progress, and manages the state of daily (or weekly or monthly) reports. In this case, one distribution per day is sufficient for such information. Accordingly, the sending conditions in this scenario may be low priority, in which the information is sent once a day via Email. Notification requests relating to reports issued by the process managing application are notification requests to line supervisors and floor supervisors; accordingly, the priority thereof is low. The format of the report is included as an attachment file, and further, a URL address indicating the location to save the report (a URL is inserted according to the attached report, since the location to save the report differs depending on the date or the report) is included.

Upon receiving the notification request, the notification managing unit 12 transfers notifications once a day. However, in the event that the settings for a notification request are to transmit in real-time, the notification request is immediately transmitted to the notification transmission module 12f without going to the notification queue administration module 12d, even though the priority of the notification request is low. The receiver opens the attachment file contained in the notification, fills in the predetermined contents for each item, and clicks on a URL within the notification, which downloads a login screen from the WWW server, so that in the event that login is successful, the report of the predetermined date can be uploaded to the URL to which it is to be saved.

Operation manual that are downloaded from the manual saving applications must be saved in the newest (i.e., most updated) state, at least until the date of execution. At

the time of downloading a manual, the manual saving application receives a reception confirmation notification including information associated with the individual who will be downloading, thereby verifying that the manual is being downloaded by the appropriate process supervisor. The manual saving application is provided with an information receiving apparatus created of a Java applet (in this instance, a Java applet with information reception functions is referred to as an information receiving apparatus), which is first downloaded to the terminal in the event that a manual obtaining request is issued. Once the information receiving apparatus according to the Java applet is downloaded and assembled into the browser, the information receiving apparatus sends a manual obtaining request to the WWW server again. The WWW server recognizes that the obtaining request is from the information receiving apparatus, based on the information for identifying information receiving apparatuses included in the header of the manual obtaining request. Once confirmation is made that the obtaining request is valid, the manual is downloaded to the terminal.

Reception confirmation notifications regarding information originated from manual saving applications and process managing applications include at least application ID, notification request ID, and member ID. The process administrator originates a reception state confirmation request to the WWW server from the terminal to which is provided the information transmitting apparatus, and obtains the reception state information from the WWW server. Then, based on this information, verification is made regarding whether the manuals are being referred to and followed.

The above has been a description of a process managing system as an example of the information sharing system using the information saving server 1, information transmitting apparatus 2, and information receiving apparatus 3. Although the present invention has been described with respect to the Internet, it is recognized that any type of

network can be utilized (e.g., LANs, Dial-up, etc.).

Also, an arrangement may be made wherein programs for realizing the information transmitting apparatus or information saving apparatus or information receiving apparatus are recorded on a computer-readable recording medium, the

5 programs recorded on the recording medium are read into a computer system and executed thereby, thus realizing the functions of the information transmitting apparatus or information saving apparatus or information receiving apparatus. That is to say, the program causes the computer to execute the functions of the notification creating unit and the functions of the data exchange unit of the information transmitting apparatus.

10 Additionally, the program causes the computer to execute the functions of the application unit and the functions of the notification administration unit of the information saving apparatus. Further, the program causes the computer to execute the functions of the reception confirmation notification creating unit and the functions of the data exchange unit of the information receiving apparatus.

15 In order to adapt an information sharing environment to a mobile networking environment, an arrangement may be used wherein even if a terminal that does not possess the functions of the information transmitting apparatus or the information receiving apparatus according to the present invention, the terminal may download the necessary software to perform the functions of the apparatuses from a software saving
20 apparatus or the information saving apparatus according to the present invention. The software saving apparatus and the information saving apparatus are set up on the network and have stored therein software for realizing the functions of each of the apparatuses by the terminal. The stored software, once downloaded in the terminal, causes the computer system built into the terminal to read and execute the programs, thus realizing
25 information sharing. The term "computer system" as used here includes operating

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systems and hardware such as peripheral devices and the like. Also, if a WWW environment is employed, the term "computer system" as used here also includes homepage enabled environments (or display environments). Further, the term "computer-readable recording medium" as used here means portable media such as floppy disks, magneto-optical disks, ROM, CD-ROMs, etc., and storage devices such as hard disks built into the computer system. The term "computer-readable recording medium" as used here includes objects which temporarily dynamically hold programs such as the communication line in the event of transmitting programs via a network such as the Internet or telephone lines or the like (transporting media or transporting waves), and in such cases, includes objects which temporarily store programs such as volatile memory within the computer systems of the server and client.

Moreover, the above programs may realize a subset of the above-described functions. Also, the above programs may be differential files (differential programs) realizing the above-described functions by combining with programs already loaded or existing within the computer system.

Embodiments of the present invention have thus been described with reference to the drawings, but it should be understood that specific configurations of the present invention are by no means restricted to the embodiments, and that the present invention encompasses designs and the like which do not depart from the spirit and scope thereof.

Thus, as described above in detail, according to the present invention, notifications accompanying sending of shared information are originated to sharing members which share information originated by a transmitter, according to sending conditions, so the receivers can obtain the shared information at an appropriate timing, according to the priority of the shared information itself, the contents of the shared information necessary for the sharing members, and so forth. Thus, the sharing members

can use an information sharing environment which is very useful.

Also, according to the present invention, reception confirmation notifications originated from the receiver of the shared information, or data based on the reception confirmation notifications, is originated to the transmitter of the shared information, so
5 the transmitter can confirm that the shared information has been received by the receiver with a high degree of certainty.

Also, according to the present invention, the notifications are subjected to encrypting and/or electronic signatures and thus originated, so that security according to the secrecy level of the notification contents and information being transferred can be
10 secured.